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PATENT COOPERATION TREATY
PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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|---|---|---|-----------------------|
| Applicant's or agent's file reference T 04006 PCT 6650 | FOR FURTHER ACTION | | See Form PCT/IPEA/416 |
| International application No. PCT/EP2004/000243 | International filing date (day/month/year) 15-01-2004 | Priority date (day/month/year) 17-01-2003 | |
| International Patent Classification (IPC) or national classification and IPC B23B 27/14, C04B 35/117, 35/119, 41/50 | | | |
| Applicant TECHNISCHE UNIVERSITÄT HAMBURG-HARBURG | | | |

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|---|--------------|---|-----------|---------------------|--------------------------|------------|----------|--------------------------|-------------|--|--------------------------|------------|----------------------------|-------------------------------------|-----------|---|--------------------------|------------|-------------------------|--------------------------|-------------|--|--------------------------|--------------|---|
| <ol style="list-style-type: none"> This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet. This report is also accompanied by ANNEXES, comprising: <ol style="list-style-type: none"> <input type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of _____ sheets, as follows: <ul style="list-style-type: none"> <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersedes earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions). | | | | | | | | | | | | | | | | | | | | | | | | | |
| <ol style="list-style-type: none"> This report contains indications relating to the following items: <table border="0"> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> | | <input checked="" type="checkbox"/> | Box No. I | Basis of the report | <input type="checkbox"/> | Box No. II | Priority | <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> | Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> | Box No. VI | Certain documents cited | <input type="checkbox"/> | Box No. VII | Certain defects in the international application | <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. II | Priority | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VI | Certain documents cited | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application | | | | | | | | | | | | | | | | | | | | | | | |

**CORRECTED
VERSION**

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|---------------------------------------|-----------------------------------|
| Date of submission of the demand | Date of completion of this report |
| Name and mailing address of the IPEA/ | Authorized officer |
| Facsimile No. | Telephone No. |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/000243

Box No. I Basis of the report

1. With regard to the language, this report is based on:

the international application in the language in which it was filed
 the translation of the international application into _____, which is the language of a translation furnished for the purposes of:
 international search (Rule 12.3(a) and 23.1(b))
 publication of the international application (Rule 12.4(a))
 international preliminary examination (Rule 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished
 the description:
 pages 1-19 _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____
 the claims:
 pages 1-28 _____ as originally filed/furnished
 pages* _____ as amended (together with any statement) under Article 19
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____
 the drawings:
 pages 1/7-7/7 _____ as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. The amendments have resulted in the cancellation of:

the description, pages _____
 the claims, Nos. _____
 the drawings, sheets/figs _____
 the sequence listing (*specify*): _____
 any table(s) related to sequence listing (*specify*): _____

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages _____
 the claims, Nos. _____
 the drawings, sheets/figs _____
 the sequence listing (*specify*): _____
 any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/000243

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-----------------------------------|-----|
| Novelty (N) | Claims | <u>12, 16, 26</u> | YES |
| | Claims | <u>1-11, 13-15, 17-25, 27, 28</u> | NO |
| Inventive step (IS) | Claims | <u></u> | YES |
| | Claims | <u>1-28</u> | NO |
| Industrial applicability (IA) | Claims | <u>1-28</u> | YES |
| | Claims | <u></u> | NO |

2. Citations and explanations (Rule 70.7)

1. Reference is made to the following documents:

D1: US-A-5 275 981 (KATO MUNENORI ET AL)
4 January 1994 (1994-01-04)

D2: US-A-4 447 263 (TOYAMA JUNICHI ET AL)
8 May 1984 (1984-05-08)

D3: PATENT ABSTRACTS OF JAPAN, vol. 017, no. 096
(M-1372), 25 February 1993 (1993-02-25)
& JP 04 289002 A (MITSUBISHI MATERIALS CORP),
14 October 1992 (1992-10-14)

D4: PATENT ABSTRACTS OF JAPAN, vol. 017, no. 648
(M-1518), 2 December 1993 (1993-12-02)
& JP 05 208304 A (MITSUBISHI MATERIALS CORP),
20 August 1993 (1993-08-20).

2. The subject matter of claims 1 and 4 fails to satisfy the requirements of PCT Article 6. The reasons are as follows:

2.1 The following terms lack clarity or are inadequately defined: "sacrificial phase" and "hard material phases" in claim 1 and "characteristic elements" in claim 4. Said terms have not been regarded as restrictive.

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2.2 Claim 1 lacks clarity because it is unclear whether "optionally" refers only to the additives or also to the primary hard material phases.

2.3 Product claim 1 is, in part, defined in terms of method features: "not deposited" and "is formed by hardening the base ceramic in a defined atmosphere". These features have not been regarded as restrictive.

2.4 The expression "the edge zone being closely intergrown with the starter ceramic" (claim 1) does not constitute a precise definition. For the purpose of the examination, this expression has been interpreted in its broadest possible sense. The expression "transition zone of between 50 nm and 5 µm" is not clearly defined (claim 9). This feature has not been regarded as restrictive.

2.5 Expressions such as "preferably", "optionally" and "specially", likewise, do not restrict the scope of protection of the claim, that is to say any feature preceded by such an expression must be considered entirely optional.

3. The subject matter of claims 1-11, 13-15, 17-25, 27 and 28 do not appear to be novel (PCT Article 33(2)). The reasons are as follows:

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International application No.
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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

3.1 Document D1 (column 6, line 51 to column 7, line 56; claims 1, 2 and 5; and examples 4, 8 and 9) discloses a ceramic cutting tool, being a multiphase ceramic cutting tool made of a base ceramic material (Al_2O_3) and a "sacrificial phase" (metal carbo-nitride), which cutting tool can be provided with an edge layer made of a hard material phase (see for example claim 5). The grain size is less than 1 μm (column 2, lines 20-24). Titanium oxycarbide (claim 11) is disclosed in example 7.

In consequence, the subject matter of claims 1-11, and 28 does not appear to be novel over D1,

3.2 Document D2 (examples and tables) discloses a ceramic cutting tool, being a multiphase ceramic cutting tool, said tool being made of a base ceramic (TiN), a "sacrificial phase" (TiC) and an edge layer, which layer was produced by hardening the starting ceramic in a defined atmosphere and, in consequence, must have been closely intergrown with the starter ceramic.

In consequence, the subject matter of claims 1, 2, 7, 8, 14, 17-25, 27 and 28 does not appear to be novel over D2.

3.3 Document D3 (abstract, tables) appears to disclose a ceramic tool, being a multiphase ceramic tool

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

made of a base ceramic (Al_2O_3) material, a "sacrificial phase" (TiCN) and an edge zone, the edge zone containing a higher proportion of TiCN than the base ceramic material. The higher proportion of TiCN appears to have been obtained by hardening in $\text{CH}_4:\text{N}_2$. In addition, a single-layer or multi-layer coating can be deposited on the edge zone by means of chemical deposition.

In consequence, the subject matter of claims 1-3, 7-9, 13, 14, 19-24, 27 and 28 does not appear to be novel over D3.

3.4 Document D4 (abstract, tables, paragraph 0007 and figure 1) appears to disclose a ceramic cutting tool, being of a multiphase ceramic tool which is made of a base ceramic (Al_2O_3) material, a "sacrificial phase" (TiCN) and an edge zone, the edge zone containing a higher proportion of N. Said higher proportion of N appears to have been obtained by hardening in a defined atmosphere (HIP, argon).

In consequence, the subject matter of claims 1-3, 7-9, 14, 17-24, 27 and 28 does not appear to be novel over D4.

4. Dependent claims 12, 16 and 26 contain no features which, combined with the features of any claim to which they refer, meet the PCT requirements for inventive step. The reasons are as follows:

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Claim 12: The use of TiC as a hard layer for ceramic cutting tools is known

Claim 16: The production of ceramics by means of reaction sintering is known and the production of edge layers on cutting tools by hardening in a defined atmosphere is also known (see documents D2 to D4). It appears obvious for a person skilled in the art to combine the two.

Claim 26: The use of a sintering bed appears to be a routine measure for a person skilled in the art to describe.